

High Performance Hybrid Upper Stage for NanoLaunch Vehicles, Phase I

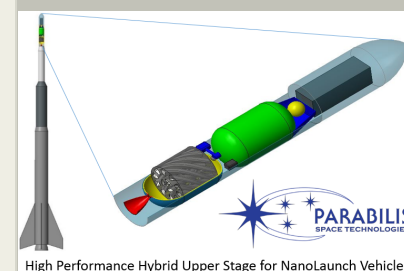
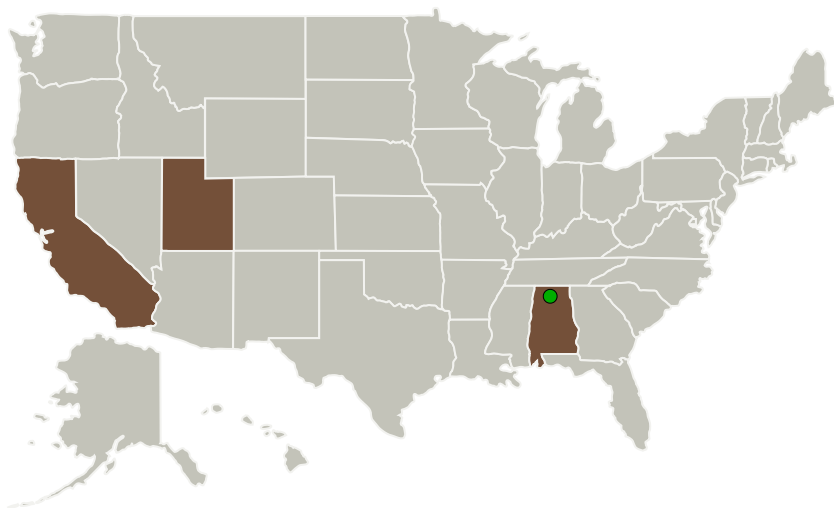
Completed Technology Project (2015 - 2016)



Project Introduction

Parabilis Space Technologies, Inc. (Parabilis), in collaboration with Utah State University (USU), proposes a low cost, high performance launch vehicle upper stage using oxygen and a novel additively manufactured polymer fuel grain as propellants in response to solicitation T1.01, Affordable Nano/Micro Launch Propulsion Stages. This technology will fulfill the ever-growing mission demands of the CubeSat and NanoSat market by enabling dedicated launch for 5-6 kg class payloads. Comparable launch vehicle stages in this size class are not currently commercially available. The proposed green-propellant system will have significant advancements over alternative technologies in cost, safety, and mission capability. During Phase I, the development team's objectives include preliminary design of an upper stage and the test fire of a demonstration prototype. This innovative stage is designed such that it can integrate directly into NASA Marshall's NanoLaunch 1200 architecture.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Parabilis Space Technologies, Inc.	Lead Organization	Industry Historically Underutilized Business Zones (HUBZones)	SAN MARCOS, California
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
Utah State University(USU)	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Logan, Utah

Primary U.S. Work Locations

Alabama	California
Utah	

Project Transitions

**June 2015:** Project Start**June 2016:** Closed out**Closeout Summary:** High Performance Hybrid Upper Stage for NanoLaunch Vehicles, Phase I Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138921>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Parabilis Space Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

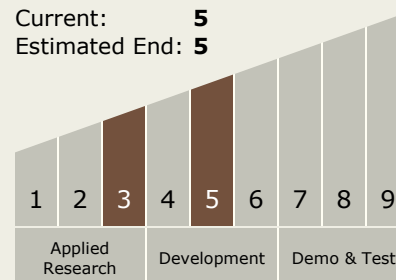
Program Manager:

Carlos Torrez

Principal Investigator:

Christopher S Grainger

Technology Maturity (TRL)

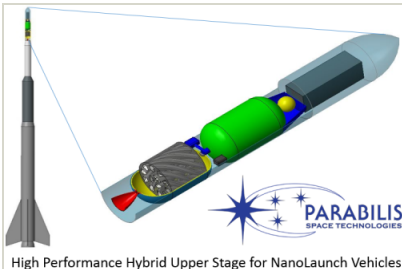
Start: **3**Current: **5**Estimated End: **5**

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Images



Briefing Chart Image

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Stage for NanoLaunch Vehicles,
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(<https://techport.nasa.gov/image/129689>)

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.5 Hybrids

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System